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ABSTRACT

This paper focuses on the efficiency of federal subsidies in meeting stated public goals and gives two reasons for doing so. First, specific data on subsidies for the education function of medical schools are available. Second, Congress is now considering the entire package of federal health manpower legislation. It is difficult to escape the conclusion that the current means of public support are both inefficient and expensive methods of meeting public needs. This paper concentrates on three objectives that constitute the most commonly stated justifications for public support: increasing the production of doctors; improving their geographic and specialty distribution; and increasing the enrollments of low-income and minority students. The estimates of the cost of subsidies to medical and dental education are both so high that they strongly indicate the present subsidy system is wasteful. At the minimum, they suggest that Congress and state legislatures should at least begin to consider other mechanisms for meeting the social goals that underlie public support for medical education. These include not only broad shifts in emphasis away from high cost manpower to lower cost mid-level health workers, but also include changes in the amounts, and more particularly, the type of subsidies granted to medical education. (Author/PG)

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THE EFFICIENCY OF FEDERAL SUBSIDIES TO MEDICAL EDUCATION

by George E. Wright, Jr.

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In the decade since 1962, public funding of medical schools has increased enormously from an annual rate of $320 million to over $1.2 billion.[1] This combined total of all state and federal monies masks an even faster increase in the funds directed specifically at education--particularly the advent of the Health Professions Educational Assistance Act of 1963 and the subsequent evolution of formula grants in 1965, 1968, and 1971 legislation. With the entire package of federal health education support currently up for renewal before Congress, public support of medical education has become the subject of increasing debate which is centered around two primary alleged difficulties.[2] First, current support is seen as inequitable since it subsidizes high-income doctors with low- and middle-income taxes. Second, this transfer is made all the more objectionable, because the need for more doctors is said to be diminishing. The implication is that this projected demise of the "doctor shortage" vitiates the necessity of intensive public programs.

The purpose of this paper is to analyze neither of these criticisms, but to ask a simpler question. How well does the present system of public support work? Supposedly, legislatures appropriate public funds for medical education in order to encourage medical schools toward social needs which would otherwise go unmet. Since schools are, in effect, being paid to deliver services, how efficiently does the present system of federal funding use public resources to accomplish public purposes? Put bluntly, given the purposes of subsidy it is useful to inquire whether we are getting our money's worth. There are multitudinous goals and aims which can be attributed to the subsidization of medical education. We will concentrate here on three objectives which constitute the most commonly stated justifications for public support: (1) increasing the production of doctors, (2) improving their geographic and specialty distribution, and (3) increasing the enroll-

ments of low-income and minority students.

I. INCREASING THE SUPPLY OF PHYSICIANS

Until very recently the primary justification for the increased federal support of medical education was concern over a doctor shortage. As late as 1971, Administration officials testified before Congress that there was a current shortage of at least 50,000 physicians, only 40% of which was directly related to geographic maldistribution.[3] To fill this manpower gap public funds have been used for construction of new facilities as well as support for the operating expenses of additional faculty and teaching programs. The obvious question in reviewing these past programs is exactly how much of an increase have the funds purchased? A full answer to this question is impossible, since many different categories of public funds finance a multiplicity of medical school outputs and activities. We can, however, look at one small proportion of non-research subsidies. Federal grants are made specifically to support undergraduate medical education and educational facilities construction through the Health Professions Educational Assistance programs.

Between FY 1967 and 1973, Basic Support plus Special Project Grants (student scholarships and loans are excluded) ran to a total of $516 million. The previous subsidy in FY 1966 was $6.6 million, as illustrated in Table I. We allow this amount to maintain its approximate real value by annual increases of 7.4%, which is the average annual amount by which median salaries of clinical faculty rose between 1965 and 1972.[4] By subtracting the constant dollar value of the 1966 level of subsidy from subsequent years, we obtain a measure of the total <u>increase</u> in federal operating subsidies equal to $454 million over the seven years from 1967 to 1973.

How many additional doctors did this additional half billion dollars of support procure? An increase in funding in 1967 could only substantially

TABLE I

Additional Operating Subsidies for Medical Education
FY 1967-1973

Fiscal Year	Actual Obligations [A] (in millions)	FY 1966 Obligations [B] at Constant Prices	Net Increase (1-2)
1967	$18.78	$7.05	$11.73
1968	25.72	7.57	18.14
1969	40.91	8.13	32.77
1970	56.20	8.74	47.46
1971	77.00	9.38	67.62
1972	148.53	10.08	138.45
1973	148.89	10.82	138.06
Total	516.01	61.78	454.23

A. Obligations for supporting the operating costs of medical education are defined as the sum of all institutional support under federal H.P.E.A. programs.

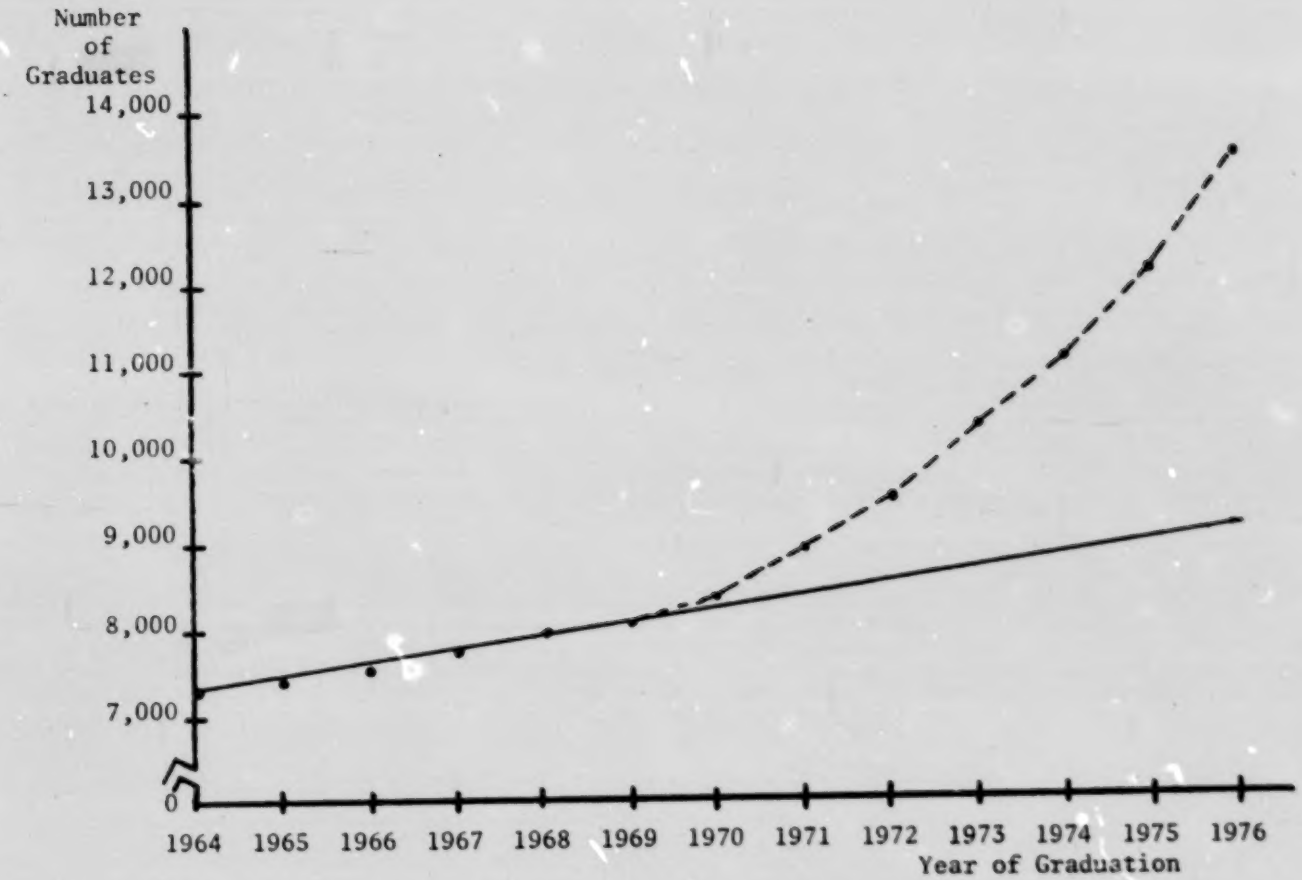
B. 1966 obligations were $6.57 million. Their constant dollar value is approximated by inflating at an average annual rate of 7.4%.

affect the output of physicians by encouraging an increase in the size of the entering class. We would see little effect on the number of graduates until four years later in 1970. Between 1964 and 1969, the size of graduating classes grew along a remarkably steady trend line, increasing at an average of 1.83% a year. Projecting this past growth forward generates an estimate of the output of doctors if federal support had remained at 1966 levels in constant dollars. If the actual number of graduates is subtracted from expected number, we obtain a measure of the gain in the number of physicians due to additional federal support. The assumptions made here are first, that the continued growth in the number of graduates at the old trend rate of 1.8% a year is due to the continuation of previous federal subsidies, the growth of all other sources of institutional support, increased student aid, and decreased attrition rates. Second, all of the additional increase above the previous trend is therefore due to the increased federal subsidies to institutions. The biases in these assumptions are discussed more fully in the Conclusion.

Figure 1 illustrates this procedure with the solid line indicating the pre-subsidy trend in graduates and the broken line tracing the actual numbers. What is measured as the gain in physicians due to increased H.P.E.A. funding is the gap between the two. The actual numbers are presented in Table II. Note that the last three years in the Table, 1973 to 1975, present a problem. Current subsidies will affect future output. The future graduates are estimated from present first-year enrollments. (Past experience suggested that 98% of first-year enrollments graduate four years later). Future graduates will also receive future public support so that not all of the increase in the 1975-76 graduating class, for example, can be attributed to current subsidies. Indeed, only one-fourth of their education has

FIGURE 1

Number of Medical School Graduates: Actual vs. 1964-1969 Trend



--- Actual number of graduates with 1974-1976 predicted from first-year enrollments 1971-1973.

—— Expected number of graduates at the 1964-1969 trend average annual rate of growth = 1.83%.

been supported in FY 1973. The adjustment proportions in column 4 of Table II take rough account of the proportion of future increase currently supported.

Tables I and II can be combined to give an estimate of how efficiently H.P.E.A. support has been used to generate doctors. Medical schools received

TABLE II

Increase in the Number of Medical School Graduates Due to Subsidy

1970 - 1976

Academic Years	Expected number of graduates with an annual growth of 1.83%	Actual Number of graduates	Gain (2-1)	Proportion of Gain due to 1967-73 subsidy	Gain due to subsidy (3x4)
1969-70	8,243	8,367	124	1.0	124
1970-71	8,394	8,974	580	1.0	580
1971-72	8,547	9,551	1,004	1.0	1,004
1972-73	8,703	10,391	1,688	1.0	1,688
1973-74	8,862	11,121	2,259	.75	1,694
1974-75	9,024	12,114	3,090	.50	1,545
1975-76	9,188	13,451	4,263	.25	1,066
Totals	60,961	73,969			7,701

an additional $454 million and produced an additional 7,701 doctors. The cost to the Treasury for each additional doctor is $58,984. What is striking about this figure is that it has risen substantially with the impact of the 1971 Comprehensive Health Manpower Training Act. Referring back to Tables I and II, suppose subsidies had been maintained at the FY 1971 level for the first three years of the Act's operation, FY 1972-74.[5] We have spent a total of $446.4 million of which $215.4 million is in excess of 1971 levels (subtracting three times $84.1). Table III follows a process similar to

TABLE III

Number of Additional Graduates 1974-77

Academic Years	1 Expected Number of Graduates	2 Actual Number of Graduates	3 Gain (2-1)	4 Proportion of Gain Due to 1972-74 Subsidy	5 Gain Due to Subsidy (3 x 4)
1974-75	11,121	12,114	993	.75	745
1975-76	11,121	13,451	2,330	.50	1,165
1976-77	11,121	13,773	2,652	.25	663
Total	33,363	39,338			2,573

Table II in estimating a total additional output of 2,573 physicians. We may infer, therefore, that $83,772 of additional public funds were required for each additional physician produced under the new 1971 legislation, or an increase of over $22 thousand over the estimate for seven years.

This figure covers only operating subsidies under H.P.E.A. programs so that some account should be made of construction support. Again we can ask, how much has been spent and how many new places in medical schools have been created as a result? Certainly during the same period, FY 1967 to 1973, federal construction grants have run at almost the same level as the annual

operating subsidies.[6] Government budget figures, however, do not clearly indicate the impact on expanding first-year enrollments because of the long and varying delays between obligation and project completion. Another estimate of the impact of federal expenditures can be obtained from the records of medical schools.[7] Between the academic years 1966-67 and 1972-73 medical schools completed $642 million worth of construction for instruction and support facilities. This total excludes all research and medical care construction. Over the same period, federal programs directly financed an average of 33.8% of all medical school construction. Pro-rating total instruction facilities construction by this proportion provides an estimate of $217.0 million of federal subsidies for medical school construction actually completed.

We assume that the increase in first-year places this year is due to construction completed the previous year. The growth in capacity supported by the $217 million subsidy is therefore estimated as the increase in first-year openings between 1967-68 and 1973-74 or a total of 4,311 new places. An average of $96,800 in federal subsidies was granted for each new place created. This expenditure, however, is spread out over many generations of new graduates. If we assume a depreciation life of 40 years, a total of 38 generations will flow from the completed construction, and the per-graduate construction subsidy falls to $2,547.*

Adding together construction and operating subsidies for the FY 1967-1973 period, each additional graduate, due in part to increased federal subsidies, has cost the Treasury a total of $61,531. This estimate jumps to

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*Given a forty-year life span, no new physicians will be produced for the first three years. At the end of the period, medical students will have received some training but not graduated: three-quarters, one-half and one-fourth of a four-year course.

$86,269 for FY 1972 and 1973. Two major comments should be made on these figures. First, this is an expensive subsidy. The recently published study of the costs of medical education undertaken by the National Academy of Sciences places the total average cost of four years of education in 1972-73 at $50,600.[8] The calculated additional federal subsidy to institutions alone per additional graduate is over two-thirds higher than the average total cost.*

The second point is the obvious fact that the federal subsidies used in these calculations include only a fraction of total public support for medical education. According to the data presented in the National Academy of Sciences study, out of an average per student annual cost of $12,650, less than half, or $6,318 was attributable to classroom instruction and support facilities. Of the total cost, 27% was due to research activities and 23% chargeable to patient care.[9] The large federal subsidies to research budgets, hospital expansion and laboratory construction constitute significant additional support for education. For the five fiscal years 1967-1971, funds granted through the Health Professions Education Assistance Program totaled $746 million. During the same period, H.E.W. obligations to medical schools ran five times this amount totaling almost $3.8 billion.[10] Funds from other departments ran the total even higher.[11] How much of this additional support is directed toward education is unknown but the figures on per-student subsidy are most surely underestimates.

The real issue which this paper should address is not the efficiency of federal subsidies but that of all public subsidies to education. Often lost in debates over federal programs is the fact that state and local

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*Moreover, the National Academy study demonstrates that considerable amounts of the average per-student cost are covered by patient-care and direct research revenues. Deducting these "Off-Setting Revenues" leaves an uncovered average cost of $37,800.

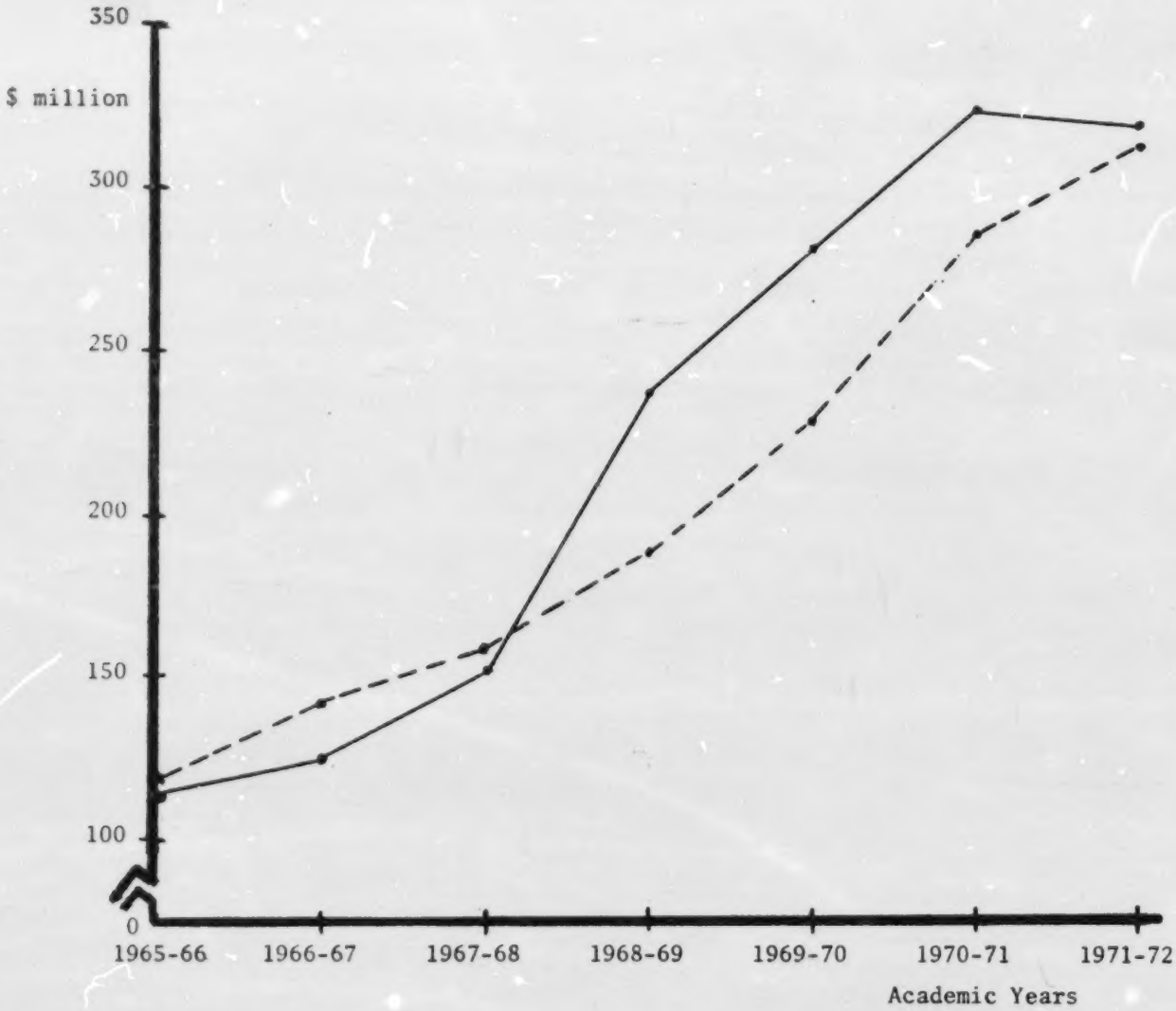
appropriations to medical schools have kept pace with the tremendous growth in non-research federal funding. As Figure 2 indicates, non-research state and local grants and subsidies now almost equal all receipts from the federal government net of sponsored research and attendant indirect costs. Both state and federal totals overstate the support for undergraduate training. Although hospital operations are formally excluded from the A.M.A. data, some of the state appropriations support hospital budgets. The vast bulk of the state funds, however, are often in the form of general budget support. Federal funds are more closely tied to specific programs and include substantial training grants for post and undergraduate research plus multi-purpose programs of health care and research. It is quite probable that in terms of funds available for the education of medical students, state support outweighs federal funding.

If more detailed data were available, the actual additional subsidy per additional M.D. produced would be substantially higher than the estimates made above. For example, if federal construction subsidies to medical schools are examined in light of the number of new places directly attributable to project funding, per new place subsidy averages $192,118 or $5,574 with a forty-year amortization.[12] This is more than double the $2,547 figure presented earlier. Since the limited additional federal operating subsidy per additional M.D. produced is now running almost $85,000, it is difficult to escape the conclusion that taxpayers are paying out a total of at least $100,000 and probably more than $150,000 in additional taxes for each additional doctor in excess of the pre-subsidy trend in the numbers of medical graduates.

Why are these additional M.D.s so expensive? Although construction costs are high, they are spread out over so many generations of new graduates that their burden per physician is comparatively small. The element of public

Figure 2

Growth of Non-Research State and Federal
Grants to Medical Schools
Academic Years 1965-66 - 1971-72



—— Federal grants net of sponsored research and recovery of indirect costs of contracts and grants.

--- State and local appropriations and grants for public and private schools and regional compacts net of sponsored programs and research.

Source: Education Numbers, Journal of the American Medical Association.

subsidies which drives up the cost is therefore the support of operating expenses. A major justification for increasing public support has been the necessary increase in the number of physicians trained. Yet in pursuit of this goal we have chosen not only to expand medical school capacities, but to underwrite the operating costs of educating all students, not simply the increase in the number of students. It is this strategy of subsidy which makes present programs so expensive. Student scholarships are granted and low tuition maintained for all students whether or not they would be willing to pay a greater share of education costs, whether or not they represent any increase in output. We are financing all to support the few, and this is an inefficient and ineffective strategy for subsidy.

The Capitation system in the Comprehensive Health Manpower Training Act of 1971 provides a clear example of the problem. For a hypothetical school with four classes of 100 medical students each, the capitation formula provides for a total annual grant of $1.15 million.[13] To obtain this grant, however, a school of this size must give "reasonable assurances" of a 10% increase in first-year enrollment. These additional 10 students therefore cost the taxpayer $115,000 in addition to the $11,500 in capitation their four years in attendance will earn.* Since capitation provides only a portion of H.P.E.A. support, only the fact that medical schools have outperformed these "incentives" by a wide margin has kept the subsidy costs as this paper has calculated.

II. IMPROVING THE DISTRIBUTION OF PHYSICIANS

The geographic maldistribution of physicians is rapidly emerging in the

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*The school receives $1.15 million annually in exchange for an annual increase of 10 students, or $115,000 per student. The capitation formula provides $2,500 per first-, second-, and third-year student and $4,000 per graduate in that year.

minds of many as perhaps the primary issue facing health manpower policy. Certainly public subsidies to medical education have been supported not only to train additional numbers but to "encourage trained personnel to practice their skills in the service setting and geographic areas where they are needed most and where they can make the greatest contribution to the health care of the Nation."[14] How effectively have federal programs met this goal? Certainly there is a strong feeling that loan forgiveness in exchange for service in an area of shortage has not worked at all.[15] Average physician income is so high and the amount of indebtedness is so comparatively low that cancellation is not an effective incentive.

The main tool for improving the geographic distribution of physicians therefore appears to be both the construction of new medical schools and the expansion of existing facilities in shortage areas. As Table IV illustrates, between FY 1965 and 1972 the federal Health Professions Educational Assistance programs have in part supported the construction of 16 new four-year medical schools in 15 states. The bulk of construction grants for new schools, however, has been devoted to the most privileged states, so that out of a total of $163.0 million, only the $47 million appropriated to new schools in Texas, New Mexico, and Louisiana can be seriously considered as a specific attack on the needs of shortage areas.

This same pattern is continued if construction grants to new and existing schools are considered. From FY 1965 to 1972 a total of $555.7 million in H.P.E.A. subsidies were granted which supported the creation of 2,869 new first-year places.[16] We assume as a policy target the 34 states (two-thirds of all states) which ranked lowest according to 1970 physician-population ratios.[17] These 34 states contain over half the U.S. population and received 45% of both total subsidy dollars and the number of new places created. Clearly

TABLE IV

Location of New Four-Year Schools Supported by H.P.E.A. Construction Grants 1965-1972

State	Physicians per 100,000 pop., 1970	Rank in phy./pop. ratio	No. of new places	Total subsidy in $ millions
New York	238	1	96	17.8
Massachusetts	211	2	100	13.8
Connecticut	193	4	48	15.4
California	192	5	96	7.5
Pennsylvania	165	8	64	19.0
Rhode Island	163	9	25	1.9
Florida	161	10	96	5.5
Arizona	157	11	64	18.0
New Jersey	153	12	64	4.3
Missouri	152	13	100	8.9
Hawaii	151	17	48	2.1
Michigan	147	18	64	2.3
Texas	123	27	148	20.9
New Mexico	123	28	48	4.8
Louisiana	119	31	100	21.2

Sources: U.S. Department of Health, Education, and Welfare, Public Health Service, National Institutes of Health, Construction Grants Administered by the Division of Physician and Health Professions Education (June 30, 1972).

U.S. Department of Commerce, Bureau of the Census, Statistical Abstract of the United States, 1972, Table 102, p. 70.

subsidy policy has not been designed to encourage a radical physician redistribution but rather supplies new physicians on a roughly equal proportional basis.

The efficiency of this in terms of encouraging an improved distribution is made all the more dubious by the low retention rates of M.D.s by the states supplying undergraduate medical education. A study of the number of 1950-59 graduates practicing in 1967 in the same state as their medical school illustrates the problem.[18] For the 34 states with low physician-population ratios, retention rates were highly variable. Only 23% of the graduates from Creighton and the University of Nebraska medical schools remained in Nebraska. Texas, on the other extreme, retained 72% of its graduates with an average for the group of 48%.

Between FY 1965 and 1972, H.P.E.A. conservation grants supported the creation of 1,283 new first-year places in the 34 states with the lowest physician-population ratios. Amortizing this investment over 40 years implies a total of 48,754 additional students will enter medical school. With a 5% rate of attrition, 46,316 will graduate. The experience of the previous decade is that less than half of these will stay in the state of their education. If we raise this to 60% by assuming better retention strategies by physician-poor states, a total of 27,790 new M.D.s will be produced. Since the total federal construction subsidy over this period came to $555.7 million, each new physician in a relatively deprived state over the next 40 years costs the federal taxpayer $19,997.

As in the previous discussion of increasing the aggregate supply of physicians, this $20,000 figure does not include the substantial state construction subsidies which now outweigh total federal construction grants.[19] Nor does it include additional operating support. Since distribution is aided by <u>expanding</u> medical school output, the additional operating subsidies

estimated in Part I come into play. Adding together construction and operating support, each new physician in a shortage state cost almost $104 thousand in additional H.P.E.A. funding ($83,732 in institutional operating support plus $19,997 in construction grants). Thus the construction subsidy program is a high cost and relatively inefficient method of achieving a stated policy goal -- a better geographic distribution of physician manpower. It is inefficient, first, because physician location is only weakly determined by medical school location. The far more important variable appears to be the location of residency. Yet there is little federal policy in this area, and only a few states have enacted substantive programs.* The subsidy is also inefficient in that states are not the best unit of analysis. The problem of distribution within states is far more difficult, and medical schools only marginally influence intra-state physician location. Finally, to the extent that medical school construction does encourage improved geographic distribution, the H.P.E.A. funding has been inefficient in that grants have not been targeted toward specific policy objectives but scattered over a wide variety of schools. Of the present 112 existing or developing schools of medicine, 74 received construction grants between 1965 and 1972.

The question of geographic distribution is closely connected with specialty distribution. The desire to shift physician manpower away from narrow specialties, particularly surgery, toward primary care practices is often stated, and indeed some funds have been appropriated to medical schools for this specific purpose. Yet although the first four years of medical education

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*State intervention has come primarily through planning for and funding medical school satellites as well as primary care residencies in widely dispersed locations. Indiana has been an innovator in this area with more recent developments in Illinois, Iowa and Minnesota.

can influence student attitudes and preferences, specialty distribution is primarily determined by the postgraduate years in residency, where, as stated above, there are few specific government programs and funds and consequently little leverage to achieve public purposes.

It is useful, however, to briefly review the changes in specialty distribution which have been occurring. Whatever the degree of influence medical school has on specialty choice, we cannot expect that the federal programs since 1965 will have had much impact before 1971 or 1972. Table V illustrates the change in the specialty composition in first-year residency positions filled by the graduates of U.S. and Canadian medical schools. Compared to

TABLE V

Specialty Distribution of First-Year
Residencies filled by U.S. and Canadian Graduates
1968 - 1972

Specialty	1968		1970		1972	
	No.	%	No.	%	No.	%
Family Practice - G.P.	116		170		476	
Internal Medicine	1,801		2,204		2,442	
Pediatrics	596		743		974	
All Primary Care	2,513	29.3%	3,108	30.5%	3,892	34.4%
All Surgical Specialties	2,168	25.3%	2,449	24.0%	2,443	21.6%
Total Positions	8,573	100.0%	10,199	100.0%	11,317	100.0%

Source: American Medical Association, Directory of Approved Internships and Residencies, Volumes for 1968-69, 1971-72, and 1973-74.

the virtually frozen specialty distribution between 1968 and 1970, the next two years exhibit considerable change. Two facets of this shift stand out. First, if all the public support in the 60's is responsible for the four percentage

point increase in the share of primary care specialties, it produced in 1972 only 440 more primary care doctors than if the 1970 share had been maintained.*

Second, and more importantly, the figures seem to suggest that the additional primary physicians are coming largely from increased medical school capacity. That is, the number of graduates entering the over-stocked surgical specialties is the same in 1972 as in 1970. The same stationary enrollment levels appear in many of the other specialties -- urology, ophthalmology, dermatology and so forth. Primary care has behaved quite differently. Of the total increase of 1,118 first-year residents, 70% went to primary care specialties. The specialty distribution in percentage terms therefore appears to be shifting according to increases in the total number of graduates rather than absolute decreases in the numbers entering any particular specialty. To the extent this trend continues, society is saddled with a highly inefficient mechanism of change. We have previously concluded that the creation of additional graduates has been enormously costly. Creating additional primary care physicians by changing in effect the specialty distribution of only the new and not the existing capacity is an equally expensive and inefficient procedure.

III. INCREASING MINORITY AND LOW-INCOME ENROLLMENTS

Perhaps the most oft stated goal for increasing federal subsidies to medical education is the desire to increase student support while maintaining low tuitions so that students of all backgrounds may enter the medical profession. Table VI offers a rough approximation of the increase in minority and low-income

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*Multiplying 30.5% times 11,317 first-year positions gives 3,452 primary care physicians. Previous experience suggests that there is considerable shifting of specialty concentration during and after the residency years and that the biggest net loser is primary care. We should not expect to realize all of the 440 additional doctors. See footnote 20 for sources.

graduates. The number of 1974-1976 graduates were extrapolated from first-year enrollment figures adjusted for present failure rates. The numbers for Black graduates were reduced by the overall percentage of women graduates.* Between 1963 and 1967 the percentage of medical students whose parental income fell below $10,000 dropped from 51% to 37%.[21] Given the strength of this trend, the 30% figure was selected and should cover some families above $10,000. Since we wish to inquire how many additional graduates above past levels have been generated by new federal programs, the graduates in excess of the 1969 level are calculated in the final column with a total of 5,340.

What federal funds have been devoted to the education of these additional graduates? The assumption made here is that once additional capacity is created and operating costs covered, the only subsidies necessary are scholarships and loans to support and encourage a shift in the composition of enrollments towards new categories of students. And up to this point no account has been made of H.P.E.A. student support. Table VII presents an estimate of total federal direct student aid in excess of FY 1966 funding.** The FY 1966 obligations are inflated at 6.5% a year to reflect the average annual increase in student expenses.[22] Subtracting this constant value for student aid provides an estimate of $49.6 million over the seven years since 1965-66 in additional support.***

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*There are small enrollments of other minorities but no accurate data on actual graduates.

**Fiscal Years approximate but do not coincide with academic years. Similarly, government obligations are not exactly reflected in school receipts. Student financing however, is so rapidly used according to a fixed schedule that the discrepancy between FY obligations and academic year receipts for loans averages only 0.6%. No comparable data are published for scholarships.

***It is interesting to note, however, that H.P.E.A. loan funds have grown little beyond the 6.5% rate of inflation so that most of the increase shown in Table VII represents new scholarships.

TABLE VI

Increase in Minority and Low Income Medical School Graduates

Year of Graduation	All women	Black males [A]	Low Income Non-Black males [B]	Total	Increase over 1969	Proportion of gain due to 1967-1973 subsidy	Gain due to subsidy
1969	607	131	2,196	2,934	—	—	—
1970	700	151	2,255	3,106	172	1.0	172
1971	827	163	2,395	3,385	451	1.0	451
1972	860	208	2,545	3,613	679	1.0	679
1973	924	310	2,747	3,981	1,047	1.0	1,047
1974[C]	1,130	503	2,846	4,479	1,545	.75	1,159
1975[C]	1,524	614	2,993	5,131	2,197	.50	1,098
1976[C]	2,056	567	3,248	5,871	2,937	.25	734
Total	8,628	2,647	21,225	32,500	9,028		5,340

Source: Education Numbers, Journal of the American Medical Association.

Notes: A. Estimated by reducing the total number of Black graduates by the overall percentage of women graduates.

B. Estimated by multiplying the residual of all graduates net of women and black by 30%. See text for explanation.

C. Estimated from first-year enrollments which were reduced according to previous rates of failure to graduate in four years: Women - 10%; Blacks - 20%; all others - 2%.

The increase in support since 1966 would not produce any additional minority or low-income graduates until four years later in 1970. Combining the estimate of 5,340 additional graduates since 1970 with the half million dollars in additional federal direct student support produces an average of $9,284 in subsidies per additional low-income and minority graduate. This is much lower than the previous per-student subsidies estimated in this paper. The reason for the comparative low cost is clear. Once the basic cost of educating all students is subsidized and is supported, the additional cost of changing student mix by covering out-of-pocket expenses is minimized. We should note, however, that although H.P.E.A. loans are targeted to 34.7% of students, they form 46% of a much larger pool of loan funds. This enables schools to presently disperse annual loans to almost three-quarters of their students. Thus, although the federal loans may favor specific types of students, they allow a substitution of resources for the use of all students.

IV. CONCLUSION

This paper has focused on the efficiency of federal subsidies in meeting stated public goals for two reasons. First, specific data on subsidies for the education function of medical schools are available. Second, Congress is now considering the entire package of federal health manpower legislation. The discussion of federal subsidies should not only center around debate over the equity of present subsidies and the status of the famed "doctor shortage"; it should also include consideration of the exact purposes for which we provide subsidies and the most appropriate means of meeting these aims.

It is difficult to escape the conclusion that the current means of public support are inefficient and expensive methods of meeting public purposes. What is more, the enactment of the 1971 Comprehensive Health Manpower Act ap-

TABLE VII

Additional Federal Scholarship
and Loan Support to Medical Students
FY 1967 - 1973

Fiscal Year	Actual Obligations (in $thousands) [A]	FY 1966 Obligations at Constant Prices [B]	Net Increase (1 - 2)
1967	$15,987	$10,473	$5,514
1968	17,975	11,154	6,821
1969	19,534	11,879	7,655
1970	15,700	12,651	3,049
1971	20,314	13,473	6,841
1972	23,047	14,349	8,698
1973	26,282	15,282	11,000
Total	138,839	89,261	49,578

Source: U.S. Department of Health Education and Welfare, Report to the President and Congress: The Health Professions Educational Assistance Program (Washington, D.C., 1970) and unpublished data provided by the Health Resources Administration, National Institutes of Health.

Notes:

A. Figures are for H.R.A. obligations only and do not include Office of Education loans and obligations from other U.S. agencies.

B. The FY 1966 Total of $9,834 thousand is inflated at 6.5% annually. This is the average annual rate of increase of annual direct expenditures by students which rose from $4,394 in 1967 to $5,529 in 1970. Data from Louis Smith and Anna Crocker, How Medical Students Finance Their Education (Washington, D.C., D.H.E.W., 1970) and testimony of Dr. Kenneth Endicott on results of a survey by the Division of Manpower Intelligence in Departments of Labor and Health, Education and Welfare Appropriations for 1973; Hearings Before a Subcommittee of the House of Representatives; Part 4 (Washington, D.C.: G.P.O., 1972) pp. 1046-47.

pears to have increased the inefficiency. The recent National Academy of Science study referred to in this paper has documented what is well known: medical education is an expensive proposition --- over $50,000 for four years. What must give us pause is that public subsidies are even more expensive. The Health Resources Administration alone is paying $86,000 in new subsidies for each new graduate above previous capacity, $20,000 in construction grants for each additional M.D. practicing in a physician-poor state, and $9,000 in student aid for each additional minority or low-income graduate. Adding these together, each additional M.D. from a low-income family practicing in an underserved state costs $113,000 in additional subsidies. When increases in other federal programs, state appropriations and local government grants are added, the burden of these expensive subsidies is multiplied.

Throughout this paper we have assumed that all of the increase in capacity, all of the new places in underserved states, all of the new family physicians and additional enrollment of women and minorities are due solely to increasing public monies. This assumption obviously has elements which underestimate the costs and overestimate the efficiency of the H.P.E.A. subsidies. We have previously pointed out that state appropriations alone have been increasing almost as fast as federal funding (Figure 2, p. 8), and that if all public subsidies could be included, the estimates derived in this paper could more than double. Moreover, medical schools respond to stimuli other than monetary considerations. To the extent that the changes reviewed in this paper are due to public demand, medical schools' own initiatives, new student awareness, and changing faculty attitudes, the efficiency of federal subsidies has been overstated.

There are, however, other elements in the assumptions underlying this paper which lead to overestimating the costs and underestimating the effi-

ciency of subsidies. Medical schools produce many services jointly. Increases in clerkships and clinical preceptorships, for example, may produce more health care as well as more training. To the extent that subsidies have also produced more socially valuable health care and research as a joint product with education, the results of government support have been underestimated. In particular, increasing the supply of physicians may have benefits beyond increased health care. In particular, increased numbers may increase competition and help lower the future cost of physician services.

Yet the uncounted additional benefits created by additional federal support seem vague and difficult to pin down in comparison with the factors leading to an underestimation of the costs of subsidies. It is difficult to escape the conclusion that the figures presented in this paper are underestimates of the tax resources required to obtain particular social goals.

The chief limitation of the estimates is that they are partial; they do not take into account enough variables. It is therefore instructive to compare our results with the estimates for dental education derived from Professor Paul J. Feldstein's econometric model for the dental health sector.[23] The model's system of equations describes the changes in demand for dental care, changes in dentists' productivity, the ability of schools to supply dentists, and the demand by students for admission to dental school. This model has recently been run, simulating the operation of the dental sector with and without H.P.E.A. funding.[24] The first three columns of Table VIII summarize the results. As postulated in Part I of this paper, changing future professional income and growing non-H.P.E.A. support generate, among other factors, a growing number of graduates. The additional growth due to H.P.E.A. funding comes to almost 1,500 dentists. Following the reasoning employed in Table II this figure is reduced to 940 to cover growth due to support in the Fiscal Years up to 1972.

TABLE VIII

Increase in the Number of Dental School Graduates Due to Subsidy

1969 - 1975

Academic Years	Graduates with H.P.E.A. Funds	Graduates without H.P.E.A. Funds	Net Gain (1-2)	Proportion of Gain due to 1966-72 Subsidy	Gain due to Subsidy (3x4)
1968-69	3,537	3,502	35	1.0	35
1969-70	3,602	3,551	51	1.0	51
1970-71	3,760	3,601	159	1.0	159
1971-72	3,863	3,650	213	1.0	213
1972-73	3,969	3,700	269	.75	202
1973-74	4,099	3,749	350	.50	175
1974-75	4,218	3,799	419	.25	105
Totals	27,048	25,552	1,496		940

Source: Paul J. Feldstein, "A Preliminary Evaluation of Federal Dental Manpower Subsidy Program," Health Manpower Policy Discussion Paper No. A5 (Health Manpower Policy Studies Group, School of Public Health, University of Michigan, January 1974).

How much did these extra dentists cost? Between FY 1966 and 1972, institutional and student support through H.P.E.A. funding totaled $162.6 million. Following the methodology in Part I, this represents an increase of $135.6 million above 1965 support levels as measured in constant dollars. The 940 additional dentists therefore cost $144,234 per dentist in H.P.E.A. subsidies. This is more than double the comparable cost for M.D.s and does not include the $155 million in H.P.E.A. construction grants.* The number of additional dentists generated is so low that the Feldstein model finds few changes in other areas. By 1975 the effect of the increased number of dental graduates is to raise the dentist-population ratio from 51 per 100,000 population to 52 per 100,000. The average price per visit drops only seven cents, and access to dentists through increased utilization rates is only one percent higher under the subsidy program.[25]

The estimates of the cost of subsidies to medical and dental education are both so high that they strongly indicate that the present subsidy system is inefficient, ineffective and wasteful. At the minimum, they suggest that Congress and state legislatures should at least begin to consider other mechanisms for meeting the social goals which underlie public support for medical education. These include not only broad shifts in emphasis away from high cost manpower to lower cost mid-level health workers. They also include changes in the amounts, and more particularly, the type of subsidies granted to medical education. Shifts in subsidy strategy can improve their efficiency and effectiveness.

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*The dental figure includes all institutional and student support for the seven years FY 1966-1972. Adding student support to the FY 1967-1973 estimate in Part I raises the per-graduate additional subsidy from $58,984 to $64,746 for medical education.

FOOTNOTES

1. These figures include all federal, state and local grants and appropriations for sponsored research and training as well as operating budget support. They exclude all expenditures for construction and a small amount for the indirect or overhead costs of contracts and grants from state and local governments. The figures are for the academic years 1961-62 and 1971-72 and are drawn from the Education Numbers of the Journal of the American Medical Association, Vol. 190, No. 7 (Nov. 16, 1964) and Vol. 226, No. 8 (Nov. 19, 1973).

2. For examples of these critiques within and without the Federal Government see address of Dr. Charles Edwards before the 1973 annual meeting of the Association of American Medical Colleges as summarized in Health Manpower Report (Nov. 13, 1973); Charles Stewart and Corazon Siddayao, Increasing the Supply of Medical Personnel (Washington, D.C.: American Enterprise Institute for Public Policy Research, 1973); Reuben Kessel, "Higher Education and the Nation's Health: A Review of the Carnegie Commission Report on Medical Education," Journal of Law and Economics, Vol. 15, No. 1 (April, 1972), pp. 115-127; Jeffrey Harrison and Kent Nash, "A New Approach to the Physician Shortage," Inquiry, Vol. IX, No. 1 (March, 1972), pp. 34-39.

3. Testimony of Dr. John Zapp and Dr. Kenneth Endicott of H.E.W. and Bureau of Health Manpower Education in, Health Professions Educational Assistance Amendments of 1971, Hearings before the Subcommittee on Public Health and the Environment, House of Representatives (Washington, D.C.: G.P.O., 1971), Part 2, pp. 928-47.

4. It should be emphasized that faculty salary is a very approximate deflator. Although faculty salaries are the largest component of medical school costs, their increase is probably due in some measure to the increased public funding. Median salaries for full-time clinical faculty increased from $20,132 in 1965-66 to $29,100 in 1971-72. The 1965 figure is estimated by the author from data for four faculty ranks in eight departments. Sources: "Datagrams," Journal of Medical Education, Vol. 44, No. 4 (April, 1969), pp. 317-18; and Vol. 47, No. 4 (April, 1972), pp. 305-7.

5. An autonomous trend increase for graduates is not calculated here because the time period is too short. To the extent the increase would have continued without increased support, the number of additional graduates is overstated.

6. From FY 1967 to 1972 H.P.E.A. obligations for medical school construction grants totaled $450.2 million. For FY 1973 $100 million was appropriated but it is not yet clear how much of this was actually obligated to medical schools. The seven-year total probably approaches $500 million and does not include other N.I.H. grants for research facility construction. This compares with the $516 million total in H.P.E.A. operating subsidies calculated in Table I. See: U.S. Department of Health, Education, and Welfare, Public Health Service,

National Institutes of Health, Construction Grants Administered by the Division of Physician and Health Professions Education (June 30, 1972).

7. Education Numbers, Journal of the American Medical Association.

8. Institute of Medicine, National Academy of Sciences, Costs of Education in the Health Professions, Report of a Study, Parts I & II (Washington, D.C.: January, 1974), Table 33 p. 62. The average annual cost of providing an education in fourteen sample schools was estimated as $12,650.

9. Ibid. This breakdown is calculated by the author from tabulated data.

10. Calculated from three publications: U.S. Department of Health, Education and Welfare, Public Health Service, National Institutes of Health, Office of Resources Analysis, DHEW Obligations to Medical Schools Fiscal Years 1967-1969; and DHEW Obligations to Medical Schools, Vol. 3 for both Fiscal Year - 1970 and Fiscal Year - 1971. All are published by U.S. Department of Health, Education and Welfare, Office of the Assistant Secretary for Health and Scientific Affairs, n.d.

11. See tabulations in various annual issues of Executive Office of the President, Office of Management and Budget, Special Analyses, Budget of the United States Government. In FY 1971, for example, total DHEW obligations to medical schools came to $868 million contrasted with total O.M.B. estimate of $877 million.

12. Calculated by the author from D.H.E.W., Construction Grants, op. cit.

13. Summary of the provisions and reimbursement formulas of the 1971 legislation is provided by Owen MacBride, "An Overview of the Health Professions Educational Assistance Act 1963-1971." Health Manpower Policy Discussion Paper No. A1. (Ann Arbor, Michigan; Health Manpower Policy Studies Group, University of Michigan School of Public Health, June 1973).

14. Testimony of Elliot Richardson, Secretary of Health, Education and Welfare, Health Professions Educational Assistance Amendments of 1971 Hearings, op. cit., Part 1, p. 460.

15. Henry R. Mason, "Effectiveness of Student Aid Programs Tied to a Service Commitment," Journal of Medical Education, Vol. 46, No. 7 (July, 1971) pp. 575-83.

16. H.E.W., Construction Grants, op. cit. These figures include grants to three schools of osteopathy. Medical schools alone received 546.8 million and created 2846 new places. Another 5530 places were claimed as "maintained." The highly variable definition of this term precludes analysis.

17. Physician-population ratios were taken from U.S. Department of Commerce, Bureau of the Census, Statistical Abstract of the United States, 1972, Table 102, p. 70. Physicians are defined as doctors of medicine and osteopathy, and apparently include all those who are inactive as well as active.

18. Rashi Fein and Gerald Weber, Financing Medical Education (New York, etc.: McGraw-Hill Book Company, 1971), Table 29, pp. 148-151. Other studies have used more sophisticated methodologies with similar results. When place of student origin as measured by SMA districts is taken into account the retention rates are even lower. For a review of more recent studies on medical schools and the location of subsequent practice see Warren L. Balinsky, "Distribution of Young Medical Specialists from Western New York," Medical Care, Vol. XII, No. 5 (May, 1974), pp. 437-444.

19. In 1970-71 federal sources funded 42% and states another 27% of the $563 million worth of medical school building actually under construction. By 1972-73 this proportion had fallen to 21% versus a 35% state share of $657 million in construction. Education Number, Journal of the American Medical Association, Vol. 226, No. 8 (Nov. 19, 1973), p. 903.

20. Ronald L. Crawford and Regina C. McCormack, "Reasons Physicians Leave Primary Practice," Journal of Medical Education, Vol. 46, No. 3 (March, 1971), pp. 263-274; E.B. Harvey, "The Vanishing Practitioner," Journal of Medical Education, Vol. 48, No. 8 (August, 1973), pp. 718-24; J.L. Mathis, "What Makes Doctors Want to Switch Careers?" Hospital Physician (December, 1969), pp. 73-76; Harold Boverman, "Senior Student Career Choices in Retrospect," Journal of Medical Education, Vol. 40, No. 2 (February, 1965), pp. 161-65.

21. Louis C. Smith and Anna R. Crocker, How Medical Students Finance Their Education. Washington, D.C.: U.S. Department of Health, Education and Welfare, National Institutes of Health, Division of Physician Manpower (January, 1970), p. 8.

22. See explanatory Note B in Table VII.

23. Paul J. Feldstein, Financing Dental Care: An Economic Analysis (Lexington, Mass.: Lexington Books, D.C. Heath and Company, 1973).

24. Feldstein, "A Preliminary Evaluation of Federal Dental Manpower Subsidy Program," Health Manpower Policy Discussion Paper No. A5 (Ann Arbor, Michigan: Health Manpower Policy Studies Group, School of Public Health, University of Michigan, January 1974).

25. Ibid. p. 7.